

DETAILED ACTION

The response and amendment filed 2/19/2010 are acknowledged. The rejections not explicitly restated below are withdrawn due to Applicant's response in said amendment and response. The following rejections and/or objections are either reiterated or newly applied. They constitute the complete set presently being applied to the instant application.

The New Matter rejection and rejection over 35 USC 112 2nd paragraph are withdrawn. The cited prior art is reinstated due to the resolution of the New Matter issue. The prior art rejections address the limitation of approximating the spectral pattern of the physical catalyst. The rejections are repeated and address this limitation which is a New Ground of Rejection. It is noted that Applicant provided no response to these rejections in the response filed 7/20/09.

The scope rejection is repeated claims 13 and 15 (claim 13 was inadvertently omitted) with a new reference (Rawn (1983)).

A nonstatutory obviousness-type double patenting rejection is added.

Claims 1-15 are under examination.

The text of those sections of Title 35, U.S. Code not included in this action can be found in a prior Office action.

Claim Rejections - 35 USC § 112

Claims 13 and 15 are rejected under 35 U.S.C. 112, first paragraph, because the specification, while being enabling for a method for augmenting a physical catalyst in a

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chemical reaction system by exposing said chemical reaction system to at least one frequency that is a frequency duplicated from an EM spectrum pattern of the physical catalyst or exposing the chemical reaction system to at least one harmonic frequency of a duplicated EM pattern of said physical catalyst, does not reasonably provide enablement for a method for augmenting a physical catalyst in a chemical reaction system by exposing said chemical reaction system to at least one frequency that copies at least one mechanism of the physical catalyst. The specification does not enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to make or use the invention commensurate in scope with these claims.

Copying the mechanism of a physical catalyst is interpreted to mean duplicating the physical interaction between a reactant and catalyst that lowers the transition state of the reaction such that catalysis occurs.

To be enabling, the specification of the patent application must teach those skilled in the art how to make and use the full scope of the claimed invention without undue experimentation. *In re Wright*, 999 F.2d 1557, 1561 (Fed. Cir. 1993). Explaining what is meant by "undue experimentation," the Federal Circuit has stated that:

The test is not merely quantitative, since a considerable amount of experimentation is permissible, if it is merely routine, or if the specification in question provides a reasonable amount of guidance with respect to the direction in which experimentation should proceed to enable the determination of how to practice a desired embodiment of the claimed invention. *PPG v. Guardian*, 75 F.3d 1558, 1564 (Fed. Cir. 1996).¹

¹As pointed out by the court in *In re Angstadt*, 537 F.2d 498 at 504 (CCPA 1976), the key word is "undue", not "experimentation".

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The factors that may be considered in determining whether a disclosure would require undue experimentation are set forth by *In re Wands*, 8 USPQ2d 1400 (CAFC 1988) at 1404 wherein, citing *Exparte Forman*, 230 USPQ 546 (Bd. Apls. 1986) at 547 the court recited eight factors:

- 1) the quantity of experimentation necessary,
- 2) the amount of direction or guidance provided,
- 3) the presence or absence of working examples,
- 4) the nature of the invention,
- 5) the state of the prior art,
- 6) the relative skill of those in the art,
- 7) the predictability of those in the art,
- 8) the breadth of the claims.

These factors are always applied against the background understanding that scope of enablement varies inversely with the degree of unpredictability involved. In *re Fisher*, 57 CCPA 1099, 1108,427 F.2d 833,839, 166 USPQ 18, 24 (1970). Keeping that in mind, the *Wands*" factors are relevant to the instant fact situation for the following reasons:

1. The nature of the invention, state and predictability of the art, and
relative skill of those in the art

The invention relates to a method for augmenting a physical catalyst in a chemical reaction system by exposing the chemical reaction system to at least one frequency determined from an EM spectrum of the physical catalyst, at least one harmonic frequency of a duplicated EM spectral pattern of the physical catalyst or at least one frequency which copies at least one mechanism of action of said physical catalyst wherein said at least one frequency corresponds to an EM spectral pattern under condition approximating those occurring in the chemical reaction system.

The relative skill of those in the art is high, generally that of a PhD physical biochemist.

That factor is outweighed however by the unpredictable nature of the art. The specification teaches that the exact mechanisms of catalytic action are unknown but they can speed up a reaction that otherwise would take place too slowly to be practical (page 5, lines 10-13). However, it is generally known that catalyst such as enzymes provide a physical environment that allows for a lowering of energy in the transition state of the catalyst-substrate complex. This means that the interaction of the enzyme with the substrate is stronger in the transition state than in the ground state (Rawn (1983) p. 195). Thus, there is a physical interaction between (e.g., van der Waals interactions, hydrogen bonding and ionic interactions) a catalyst and a reactant that must occur for a lowering of the transition state thus leading to catalysis.

Furthermore, in enzyme catalysis, for example, there are specific physical interactions between amino acids of the catalyst and the substrate that account for the physical mechanism of the substrate. See Rawn at pages 201-202, 205 and 208.

EM radiation is known to excite molecules molecular motion and vibrational state and to alter electronic transition states of electrons but it is unclear how this affects the physical interaction between a reactant and a catalyst such that the actual physical mechanism of the reaction is copied. Hence, there is no way for one skill in the art to know, a priori, how one can copy a catalytic mechanism of action in a reaction with a frequency duplicated from the catalysts EM spectrum with a reasonable expectation of

results. Thus, the state of the prior art does not support the broad scope of the above claims.

2. The breadth of the claims

The claims are broad insofar as they disclose a method for augmenting a catalytic reaction by determining a frequency that copies the mechanism of a physical catalyst.

3. The amount of direction or guidance provided and the presence or absence of working examples

The specification teaches at page 17, lines 1-9, that the mechanism of how platinum catalyzes the formation of water from hydrogen and oxygen gases takes place by energizing the hydroxyl radical at 1,060 THz or with its microwave frequency. It is unclear from this disclosure how the irradiation or excitation of an intermediate copies the mechanism of the physical catalyst.

The specification discloses at page 22 that the spectral pattern could be determined for an enzyme wherein the loss of that enzyme could be detrimental to a living organism. The specification fails to teach how the spectral pattern correspond to the physical action of a catalyst.

The specification teaches at page 11 that EM radiation can excite molecules to rotate, bond to vibrate and even cause electron to move. EM radiation causes electronic transitions of electrons. However, the specification fails to teach how excitation of electrons or molecules causes it to copy the mechanism, interpreted as the physical interaction between a catalyst and substrate.

4. The quantity of experimentation necessary

Because of the known unpredictability of the art as stated by Applicants and in the absence of experimental evidence commensurate in scope with the claims, the skilled artisan would not accept the assertion that one could predictably augment a chemical reaction system by duplicating at least one frequency that copies at least one mechanism of action of the physical catalyst as inferred in the claims and contemplated by the specification.

Genentech Inc. vs. Nova Nordisk states, "[A] patent is not a hunting license. It is not a reward for a search but a compensation for its successful conclusion and 'patent protection' is granted in return for an enabling disclosure of an invention, not for vague intimations of general ideas that may or may not be workable" (42 USPQ 2d 1001, Fed. Circuit 1997).

To practice the invention of the instant claims required undue experimentation due to unpredictability of the mechanism of action of catalyst, as stated by Applicants, and the lack of direction from Applicants regarding procedures for determining how some frequency of EM radiation can emulate the physical mechanism of a catalyst. The amount of experimentation required in order copy the physical mechanism of a catalyst with a frequency of EM radiation would required inventive effort and extensive experimental burden.

In light of the above discussion, the instant claims do not comply with the enablement requirement of 35 U.S.C. § 112, first paragraph, since to practice the

claimed invention a person of ordinary skill in the art would have to engage in undue experimentation, with no assurance of success.

Claim Rejections - 35 USC § 102

The claims are drawn to a method for augmenting at least one physical catalyst in a chemical reaction system comprising determining an electromagnetic (EM) spectral pattern of the physical catalyst under conditions approximating those occurring in the chemical reaction system using the physical catalyst; duplicating the frequency of the EM spectral pattern with an EM energy emitter source and exposing the chemical reaction system to said frequency of the duplicated EM spectral pattern thereby augmenting the physical catalyst. The physical catalyst comprises metals, metal oxides, metal sulfide or enzymes. Claim 9 defines certain metals. The EM spectral pattern is determined by at least one spectroscopy method. The irradiation of the system takes place using a frequency in the region the UV or visible frequency ranges. The method comprises introducing the physical catalyst into the reaction system prior to, simultaneously or after the exposing step. Claim 8 defines the spectroscopy method. The EM energy source comprises at least one laser.

The limitation of claim regarding “augmenting a physical catalyst” is interpreted to mean that the physical catalyst is present and that the at least one frequency of EM spectrum that is duplicated helps or increases the rate of the reaction caused by the physical catalyst. Claim 1 is interpreted to mean that the system comprises at least a reactant and the physical catalyst. The limitation of “under conditions approximating

those occurring in the chemical reaction system using the physical catalyst” is interpreted to mean that the reaction condition is that a physical catalyst is present.

Claims 1-4, 7-9 and 13 are rejected under 35 U.S.C. 102(b) as being anticipated by Tsutsui et al. (US 4,287,036; “Tsutsui”).

Tsutsui discloses a catalytic method for reducing chemical compounds in solution utilizing a transition metal alcoholate complex as the reducing agent augmented by exposure to a selected wavelength and intensity of light that regenerates the catalysts by photo-reduction *in situ* (col. 3, lines 34-41). The method comprises selecting an appropriate wavelength of radiation by reference to the absorption, emission and excitation spectra of the transition metal alcoholate complex solution to be of an intensity capable of inducing reduction of the metal to the desired active state. The main factors to consider for selection of the appropriate wavelength of radiation are the maximization of the absorption of the selected radiation, the maximization of the vibrational degradation process of the complex, resulting in fluorescence and the minimization of the disassociation complex (col. 4, lines 15-26). Tsutsui discloses that any skilled technician can make the determination of the wavelength appropriate for the desired transition metal alcoholate by studying the absorption, emission and excitation spectra of said catalyst (col. 5, lines 40-58). The appropriate wavelength is usually in the UV range, col. 6, line 22; instant claim 4). This would naturally be done by a UV spectroscopy method since that is the only way to determine UV absorption, emission and excitation spectra (instant claims 3 and 8). This disclosure meets the limitations of

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part a) of instant claim 1 because Tsutsui teaches that at least three types of spectral patterns (emission, absorption and excitation) of the catalyst are generated and then further teaches how to select the appropriate wavelength to augment the physical catalyst. The limitation of approximating the reaction conditions (instant claims 1 and 13) is met since the catalyst is present with the alcohol in solution which constitute the reaction conditions. The catalyst comprises the metal ion salt of iron or ruthenium which meets the limitations of a metal salt (instant claim 2) and types of metals (instant claim 9). Tsutsui discloses an example in which the reaction is effected by combining the catalyst with an alcoholic substrate and irradiation the mixture at 313 nm for six days (col. 6, lines 15-39). This disclosure meets the remaining limitations of parts b) and c) of instant claim I and claim 13 because a chemical reaction mixture was formed and a frequency of light (313 nm; instant claim 4) irradiated the reaction mixture by a UV source. Thus, the presence of the catalyst and substrate are interpreted to fulfill the limitation of the reaction system since they are both required for the reaction to take place. The nature of the augmentation by the duplicated frequency recited in instant claim I is not specific. The fact that the duplicated frequency regenerates the catalyst is considered to augment or help the reaction. Tsutsui teaches that the catalyst and substrate are combined before exposure to the duplicated frequency, thus satisfying the limitation of order of exposure in instant claim 7.

Claims 1-4, 8, 9, 12 and 13 are rejected under 35 U.S.C. 102(b) as being anticipated by Borsub et al. (1984; "Borsub").

Borsub discloses the light-dependent acceleration of the rate at which $\text{PdCl}_2(4\text{-norbornadiene})$ (PD-NBD) catalyzes the valence isomerization of quadricyclene (Q) to norbornadiene (NBD; abstract, claims 1 and 13). Borsub teaches that the electronic spectrum of PD-NBD in methylene chloride was determined and spectral assignments were made using the spectral analysis for PdCl_2en (claims 1 and 13). The spectrum is shown in Fig. 1. Borsub selected an irradiation wavelength of 313 nm. The isomerization of Q in the presence of the catalyst PD-NBD was carried out in methylene chloride in the presence and absence of light at 313 nm. This is interpreted to mean that the irradiation and introduction of the physical catalyst occur at the same time (instant claim 12). Fig. 2 demonstrates that catalysis occurs in the absence of light and is greatly accelerated in the presence of light. The dark reaction occurs at about 1% conversion per hour (p. 4827, left column under "Photochemical Studies"). This disclosure meets the limitations of claims 1 and 13 because the rate of a catalyzed reaction that occurs in the dark is enhanced when the catalyst in the reaction system is subjected to a wavelength of light determined from the absorption spectrum, as in instant claims 3 and 8, of said catalyst. The presence of the catalyst when taking the absorption spectrum is interpreted to mean approximating the reaction conditions. The presence of the physical catalyst is a reaction condition. The catalyst comprises Pd, a metal, as in instant claims 2 and 9. The wavelength of 313 nm is in the UV range, as in instant claim 4.

Claims 1, 3, 6-8, 10, 13 and 14 rejected under 35 U.S.C. 102(b) as being anticipated by Biscar et al. (1975; "Biscar").

Biscar discloses the activation of an enzymatic (instant claim 6) reaction by a frequency selected from a EMER-Raman-generated spectrum using a laser (p. 127, right col. under the heading "Introduction". The use of a laser meets the limitation of claim 10. Biscar teaches the determination of Electromagnetic Molecular Electronic Resonance (EMER) Raman spectrum of chymotrypsin (p. 129, right column through page 130; Figs. 6-7; instant claims 3 and 8, relating to taking the EM spectral pattern by Raman spectroscopy). The frequency that most stimulated the enzyme corresponds to the wavelength of the harmonic three of the fundamental frequency of the chain B measured by EMER-Raman spectroscopy (p. 133, top left paragraph). It was found that the fundamental frequency (3900 cm^{-1}) and its harmonic three ($11,700\text{ cm}^{-1}$) caused the optimum position of the S-S coupling for energy flow from chain B to chain C (p. 132, upper left col.). The limitation of under conditions approximating those occurring in the chemical reaction system using the physical catalyst is met since the presence of the physical catalyst is considered to be an approximate reaction condition. Biscar teaches augmenting effect of irradiation on the catalytic activity. Chymotrypsin and its substrate were combined and irradiated with light corresponding to 8550 angstroms (IR range, corresponding to the harmonic frequency of $11,700\text{ cm}^{-1}$), as in claims 1 and 13. This disclosure meets the limitation of combining the physical catalyst with the reactant before irradiation (claim 7). The activity of the enzyme showed increased (augmented) activity at a wavelength of 8500-8600 angstroms which corresponds to the third harmonic of the fundamental frequency ($11,700\text{ cm}^{-1}$), as summarized above (p. 133, top, left col. and Fig. 10, instant claims 1, 13 (ii) and 14).

Claim Rejections - 35 USC § 103

Claims 1-4, 7-9, 11 and 13 are rejected under 35 U.S.C. 103(a) as being unpatentable over Lichtin et al. (US 4,861,484; "Lichtin") in view of Tsutsui et al. (US 4,287,036; "Tsutsui") and Grimbergen (US 2008/0176149; evidence document).

Lichtin discloses a method to degrade organic pollutant materials into environmentally compatible products comprising the irradiation or excitation of a transition element in a solid state with photoenergy in a reaction system that includes the organic material to be degraded and a peroxide (abstract). The photoenergy is added to the reaction mixture at wavelengths absorbable by the transition element catalyst which are most effective in enhancing the activity of said catalyst. The most effective wavelengths are in the visible to near UV ranges (Lichtin patent col. 12, lines 40-45). This disclosure meets, in part, the limitations of claims 1 and 13 regarding augmentation of a physical catalyst because wavelengths most effective in enhancing the activity of the catalyst is used to irradiate the catalyst and the chemical reaction system such that the photoenergy provides increased yields of organic material degradation in comparison to those yields obtained by conventionally known processes (col. 12, lines 55-60). The disclosure by Lichtin drawn to the use of a transition metal meets the limitations of instant claim 2 drawn to a catalyst comprising a metal. Lichtin teaches that the metal catalyst can be platinum, which satisfies instant claim 9 (Lichtin patent, Table III).

The Lichtin patent discloses that the near UV or visible light is the most effective wavelength absorbable by transition state catalysts (instant claims 4 and 5). Lichtin

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teaches that water can be purified by combining a pollutant with a solid catalyst and peroxide to form a reaction mixture. The mixture is then irradiated (col. 7, lines 38-49). This disclosure meets the requirements of instant claim 7 drawn to the combination of the catalyst and reactant prior irradiation. In example 7, a transition metal catalyst was combined with organic pollutants and then irradiated by a Hg-Ar low-pressure lamp to degrade said pollutants (col. 17). Grimbergen teaches that Hg-Ar lamps emit light in a wavelength range of about 200 to about 800 nm (instant claims 4 and 5). Grimbergen is an evidence document.

Lichtin does not specifically teach that a spectrum of the catalyst was obtained by a spectral method under conditions approximating those occurring during the chemical reaction and duplicating a frequency of the spectral pattern to augment the catalyst (instant claims 1, 3, 8 and 13) or the addition of more catalyst subsequent to the exposing step (claim 11).

The disclosure by Tsutsui is disclosed *supra*. Briefly, Tsutsui teaches the selection of wavelength(s) and intensity of light that regenerates a metal catalyst alcoholate complex by photo-reduction *in situ*. The method comprises selecting an appropriate wavelength of radiation by reference to the absorption, emission and excitation spectra of the transition metal alcoholate complex solution to be of an intensity capable of inducing reduction of the metal to the desired active state. This disclosure meets the limitation of determining the spectral pattern under the approximating reaction conditions because the presence of the catalyst is interpreted to be under a reaction condition. The main factors to consider for selection of the

appropriate wavelength of radiation are the maximization of the absorption of the selected radiation, the maximization of the vibrational degradation process of the complex, resulting in fluorescence and the minimization of the disassociation complex thus decreasing the desired reaction rate (col. 4, lines 15-26). Tsutsui discloses that any skilled technician can make the determination of the wavelength appropriate for the desired transition metal alcoholate by studying the absorption, emission and excitation spectra of said catalyst (col. 5, lines 40-58). The ordinary artisan would naturally use an UV-VIS spectroscopy method to take a UV-VIS spectrum.

This disclosure meets the limitations of part a) of instant claim 1 and claim 13 because Tsutsui teaches that at least three types of spectral patterns (emission, absorption and excitation) of the catalyst are generated and then further teaches how to select the appropriate wavelength in order maximize the reaction rate. The selection occurs under conditions approximating the reaction conditions since the transition metal is present.

It would have been obvious to one of ordinary skill in the art at the time the invention was made to measure the spectrum of the catalyst of Lichtin and to duplicate a wavelength(s) or frequency(ies) that comprise the spectral pattern to augment the catalyst. The ordinary artisan would have been motivated to do so because Tsutsui teaches that it is desirable to select a frequency that causes the maximum reaction rate and to decrease undesirable processes. The ordinary artisan would have had a reasonable expectation that one could have determined the optimum wavelength(s) or frequency(ies) that comprise the spectral pattern that is duplicated to augment the

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catalyst because Tsutsui specifically discloses that that "any skilled technician can make the determination of the wavelength appropriate for the desired transition metal alcohoate by studying the absorption, emission and excitation spectra of said catalyst" (col. 5, lines 40-58). "Any skilled technician" is interpreted to mean a person that knows how to carry out the procedure for a reaction.

It would have been obvious to one of ordinary skill in the art at the time the invention was made to add additional physical catalyst to the reaction system subsequent to the irradiation step. The ordinary artisan would have been motivated to do so in order to degrade more pollutants. The ordinary artisan would have had a reasonable expectation that the addition of a physical catalyst subsequent to the irradiation step would degrade more pollutants since the catalyst has activity even without the irradiation. Since the composition components are known, it is considered prima facie obvious to combine them into a single composition useful for the very same purpose. At least additive therapeutic effects would have been reasonably expected. *In re Kerkhoven*, 205 USPQ 1069 (CCPA 1980).

Regarding the post-filing publication date of Grimbergen, the critical date of extrinsic evidence showing a universal fact need not antedate the filing date. As discussed in MPEP § 2124:

In certain circumstances, references cited to show a universal fact need not be available as prior art before applicant's filing date. *In re Wilson*, 311 F.2d 266, 135 USPQ 442 (CCPA 1962). Such facts include the characteristics and properties of a material or a scientific truism. Some specific examples in which later publications showing factual evidence can be cited include situations where the facts shown in the reference are evidence "that, as of an application's filing date, undue experimentation would have been required, *In re Corneil*, 347 F.2d

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563, 568, 145 USPQ 702, 705 (CCPA 1965), or that a parameter absent from the claims was or was not critical, *In re Rainer*, 305 F.2d 505, 507 n.3, 134 USPQ 343, 345 n.3 (CCPA 1962), or that a statement in the specification was inaccurate, *In re Marzocchi*, 439 F.2d 220, 223 n.4, 169 USPQ 367, 370 n.4 (CCPA 1971), or that the invention was inoperative or lacked utility, *In re Langer*, 503 F.2d 1380, 1391, 183 USPQ 288, 297 (CCPA 1974), or that a claim was indefinite, *In re Glass*, 492 F.2d 1228, 1232 n.6, 181 USPQ 31, 34 n.6 (CCPA 1974), or that characteristics of prior art products were known, *In re Wilson*, 311 F.2d 266, 135 USPQ 442 (CCPA 1962).” *In re Koller*, 613 F.2d 819, 823 n.5, 204 USPQ 702, 706 n.5 (CCPA 1980) (quoting *In re Hogan*, 559 F.2d 595, 605 n.17, 194 USPQ 527, 537 n.17 (CCPA 1977) (emphasis in original)). However, it is impermissible to use a later factual reference to determine whether the application is enabled or described as required under 35 U.S.C. 112, first paragraph. *In re Koller*, 613 F.2d 819, 823 n. 5, 204 USPQ 702, 706 n.5 (CCPA 1980). References which do not qualify as prior art because they postdate the claimed invention may be relied upon to show the level of ordinary skill in the art at or around the time the invention was made. *Ex parte Erlich*, 22 USPQ 1463 (Bd. Pat. App. & Inter. 1992).

In the instant case, Grimbergen discloses the wavelengths emitted by Ar-Hg lamps.

Claims 1, 3, 6, 10, 11 and 13 are rejected under 35 U.S.C. 103(a) as being unpatentable over Pratt, Jr. (US 4,115,280; "Pratt") in view of Biscar et al. (1975; "Biscar").

Pratt discloses a method of activating or deactivating macromolecular species including living cells, enzymes (instant claim 6), spores, viruses and bacteria, comprising subjecting an enzyme-containing reaction mixture to laser radiation at a frequency that excites the vibrational and rotational state of said macromolecular specie (col. 4, lines 33-45). The term activate means that a catalytic effect can be accelerated (col. 12, lines 21-24). Pratt teaches that the frequency and the amplitude of the laser output radiation is controlled to selectively affect the macromolecular catalyst (col. 10,

lines 20-35). The employment of a laser meets the limitation of instant claim 10. The effect of radiation is determined by subjecting said macromolecule to laser radiation and measuring the scattered or transmitted or reflected radiation as a function of frequency amplitude (col. 11, lines 60-68). The biological activity of the macromolecular specie can be altered selectively by varying the frequency and /or amplitude of the laser beam (col. 12, lines 9-12). Subjecting the macromolecular specie to frequencies of light from a laser meets the limitation of approximating the reaction conditions since the presence of the macromolecular specie is a reaction condition (instant claims 1 and 13).

Pratt does not specifically teach the activation of an enzyme reaction or duplicating a wavelength(s) or frequency(ies) of the spectral pattern to augment the catalyst. Nor does Pratt teach the addition of more physical catalyst to the reaction system after the irradiation step.

The disclosure by Biscar is discussed supra. Biscar teaches obtaining a EM spectrum of an enzyme catalyst under conditions approximating the reaction conditions and irradiating the reaction system including the enzyme and the substrate with laser light at a duplicated frequency from the spectral pattern that augments the action of the catalyst (instant claims 1 and 13). One must obtain a spectral pattern by a spectrophotometric method (instant claim3).

It would have been obvious to one of ordinary skill in the art at the time the invention was made to irradiate an enzyme to augment its activity. The ordinary artisan would have been motivated to do so because Pratt teaches a small genus of

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biochemical macromolecular species (five) that can be activated by the disclosed method. Hence, the ordinary artisan would easily envisage using an enzyme in the method. The ordinary artisan would have had a reasonable expectation that the activity of an enzyme could be increased by laser irradiation because Biscar demonstrates this.

It would have been obvious to one of ordinary skill in the art at the time the invention was made duplicate a frequency that positively affects the state of the macromolecular catalyst in Pratt such that it is activated to carry out the augmentation of an enzyme reaction. The ordinary artisan would have been motivated to do so because Biscar demonstrates that it was known in the art to determine spectral patterns of enzymes and to associate changes in absorption frequencies with the activity of the enzyme and that the ordinary artisan would recognize that only certain wavelength(s) of light in the spectrum achieve augmentation of catalysis. The ordinary artisan would have had a reasonable expectation that the ordinary artisan could have determined the optimum wavelength(s) or frequency(ies) that comprise the spectral pattern that is duplicated to augment the catalyst because Biscar shows that it was well known in the art to how determine absorption spectra of enzymes.

It would have been obvious to one of ordinary skill in the art at the time the invention was made to add additional physical catalyst (enzyme) to a reaction system comprising enzyme and substrate subsequent to the irradiation step. The ordinary artisan would have been motivated to do so in order to obtain more product. The ordinary artisan would have had a reasonable expectation that the addition of a physical catalyst subsequent to the irradiation step would produce more product since the

catalyst has activity even without the irradiation. Since the composition components are known, it is considered prima facie obvious to combine them into a single composition useful for the very same purpose. At least additive therapeutic effects would have been reasonably expected. *In re Kerkhoven*, 205 USPQ 1069 (CCPA 1980).

Claims 1-4, 9 and 11 are rejected under 35 U.S.C. 103(a) as being unpatentable over Mohr (US 6,217,712).

Mohr discloses a method of using radio frequency waves (instant claim 4) to artificially create catalytic action in a catalyst-free chemical reaction within a substance. Mohr teaches that in some applications it may be preferable to retain the presence of the conventional catalyst but to enhance its effectiveness by adding the NMR signal (col. 2, lines 33-45). Radio frequency waves are transmitted through the substance at a signal strength sufficient to electronically reproduce the effector of the physical presence of the selected catalyst. The radio frequency waves have a selected transmission frequency substantially equal to the catalyst signal frequency which is determined by nuclear magnetic resonance of the catalyst (col. 1, lines 54-56). Mohr teaches that the signal frequency that is emitted that is the signal frequency of the catalyst is commonly determined by nuclear magnetic resonance (abstract).

The method comprises the steps of determining the appropriate radio frequency that is substantially equal to a catalyst signal frequency of the selected catalyst. The catalyst signal frequency is the signal frequency that is determined by NMR. Mohr

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teaches that the ordinary artisan can determine the signal frequency of the catalyst in NMR tables. It naturally flows that one must take an NMR spectrum in order to generate a table of stimulating frequencies (instant claim 3). Thus, an NMR spectrum is taken and the frequency that defines the catalyst is selected. The limitation of approximating the reaction condition is met since the presence of the catalyst is considered to be an reaction condition the catalyst is present when the NMR spectrum is determined (instant claims 1 and 13).

The selected catalyst can be platinum and the frequency used is 9.29 MHz (col. 3, lines 37-52; instant claims 2 (metal) and 9 (platinum). Mohr teaches that water was dissociated by reaction with a radio signal frequency of 9.29 MHz in the absence of platinum (the signal frequency for platinum; col. 3, lines 48-50; instant claim 4). Dissolved oxygen is generated. The frequency signal can be fine-tuned during the reaction (col. 4, lines 17-24).

Mohr does not explicitly teach that the conventional physical catalyst is present in the reaction mixture under irradiation conditions. Mohr does not teach the addition or more physical catalyst to the reaction system after the irradiation step.

It would have been obvious to one of ordinary skill in the art at the time the invention was made to add at catalyst to the reaction system comprising a reactant and a frequency of NMR irradiation. The ordinary artisan would have been motivated to do so because Mohr suggests that subjecting the catalyst to the selected NMR signal enhances the effectiveness of the physical catalyst. The ordinary artisan would have

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had a reasonable expectation that one could add the physical catalyst to the reaction system to obtain product since the physical catalyst is known to catalyze the desired reaction by itself. Since the composition components are known, it is considered prima facie obvious to combine them into a single composition useful for the very same purpose. At least additive therapeutic effects would have been reasonably expected. *In re Kerkhoven*, 205 USPQ 1069 (CCPA 1980).

It would have been obvious to one of ordinary skill in the art at the time the invention was made to add additional physical catalyst to the reaction system subsequent to the irradiation step. The ordinary artisan would have been motivated to do so in order to obtain more product. The ordinary artisan would have had a reasonable expectation that the addition of a physical catalyst subsequent to the irradiation step would product more product since the catalyst has activity even without the irradiation. Since the composition components are known, it is considered prima facie obvious to combine them into a single composition useful for the very same purpose. At least additive therapeutic effects would have been reasonably expected. *In re Kerkhoven*, 205 USPQ 1069 (CCPA 1980).

Claims 1-4, 7-9, 11 and 13 are rejected under 35 U.S.C. 103(a) as being unpatentable Tsutsui et al. (US 4,287,036; "Tsutsui").

Claims 1-4, 8, 9 and 11-13 are rejected under 35 U.S.C. 103(a) as being unpatentable over Borsub et al. (1984; "Borsub").

Claims 1, 3, 6-8, 10, 11, 13 and 14 are rejected under 35 U.S.C. 103(a) as being unpatentable over Biscar et al. (1975; "Biscar").

The disclosures by Tsutsui, Borsub and Biscar are discussed supra.

None of the references teaches the addition of additional catalyst to the reaction system after the irradiation step.

It would have been obvious to one of ordinary skill in the art at the time the invention was made to add additional physical catalyst to the reaction systems or Tsutsui, Borsub or Biscar subsequent to the irradiation step. The ordinary artisan would have been motivated to do so in order to obtain more product. The ordinary artisan would have had a reasonable expectation that the addition of a physical catalyst subsequent to the irradiation step would produce more product since the catalyst has activity even without the irradiation. Since the composition components are known, it is considered prima facie obvious to combine them into a single composition useful for the very same purpose. At least additive therapeutic effects would have been reasonably expected. *In re Kerkhoven*, 205 USPQ 1069 (CCPA 1980).

Double Patenting

The nonstatutory double patenting rejection is based on a judicially created doctrine grounded in public policy (a policy reflected in the statute) so as to prevent the unjustified or improper timewise extension of the "right to exclude" granted by a patent and to prevent possible harassment by multiple assignees. A nonstatutory obviousness-type double patenting rejection is appropriate where the conflicting claims are not identical, but at least one examined application claim is not patentably distinct from the reference claim(s) because the examined application claim is either anticipated by, or would have been obvious over, the reference claim(s). See, e.g., *In re Berg*, 140

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F.3d 1428, 46 USPQ2d 1226 (Fed. Cir. 1998); *In re Goodman*, 11 F.3d 1046, 29 USPQ2d 2010 (Fed. Cir. 1993); *In re Longi*, 759 F.2d 887, 225 USPQ 645 (Fed. Cir. 1985); *In re Van Ornum*, 686 F.2d 937, 214 USPQ 761 (CCPA 1982); *In re Vogel*, 422 F.2d 438, 164 USPQ 619 (CCPA 1970); and *In re Thorington*, 418 F.2d 528, 163 USPQ 644 (CCPA 1969).

A timely filed terminal disclaimer in compliance with 37 CFR 1.321(c) or 1.321(d) may be used to overcome an actual or provisional rejection based on a nonstatutory double patenting ground provided the conflicting application or patent either is shown to be commonly owned with this application, or claims an invention made as a result of activities undertaken within the scope of a joint research agreement.

Effective January 1, 1994, a registered attorney or agent of record may sign a terminal disclaimer. A terminal disclaimer signed by the assignee must fully comply with 37 CFR 3.73(b).

Claims 1-4, 6, 9, 10 and 13 are rejected on the ground of nonstatutory obviousness-type double patenting as being unpatentable over claims 1-4 and 7-10 of U.S. Patent No. 6,033,531 in view of Mohr (US 6,217,712).

Claims 1 and 10 of '531 are drawn to a method of replacing a physical catalyst in a chemical reaction system comprising the steps of determining an EM spectral pattern of the physical catalyst, duplicating at least one frequency of the EM spectrum with at least one EM emitter source and irradiating the chemical reaction system with the duplicated frequency from the spectral pattern in an amount sufficient to catalyze the reaction, corresponding to instant claims 1 and 13, in part. The physical catalyst is a metal, metal, oxide or metal sulfide (claim 2) or an enzyme (claim 8), corresponding to instant claims 2 and 6, respectively. Metals such as platinum are recited in claim 4, corresponding to instant claim 9. The frequency can be in the radio frequency to UV range (claim 3), corresponding to instant claim 4. The spectral pattern is determined by spectroscopy methods (claim 9), corresponding to instant claim 3. The emitter source can be a laser (claim 7), corresponding to instant claim 10.

The claims of '531 do not teach a method for augmenting a physical catalyst wherein the physical catalyst is present in the reaction system. Nor do that claims of '531 teach that the EM spectral pattern is determined under conditions approximating those occurring in the chemical reaction system using the physical catalyst.

The disclosure of Mohr is discussed supra. Briefly Mohr also teaches replacing a physical catalyst (platinum) with a frequency determined from the spectral pattern of the physical catalyst. Mohr teaches that in some applications it may be preferable to retain the presence of the conventional catalyst in the reaction system. The presence of the physical catalyst is enhanced by adding the simulated radio frequency.

It would have been obvious to one of ordinary skill in the art at the time the invention was made to add the physical catalyst to the catalyst-free reaction system of the claims of '531 thus creating a reaction system that augments the physical catalyst. The ordinary artisan would have been motivated to do so because Mohr specifically suggests the addition of the physical catalyst to the reaction system with the duplicated radio frequency to enhance the action of the physical catalyst. The ordinary artisan would have had a reasonable expectation that one could add a physical catalyst to the catalyst-free reaction system of '531 and that the action of the physical catalyst would be augmented since the physical catalyst catalyzes the reaction by itself. The irradiation with the duplicated spectral frequency would also produce product, thus augmenting the action of the physical catalyst.

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Any inquiry concerning this communication or earlier communications from the examiner should be directed to SUSAN HANLEY whose telephone number is (571)272-2508. The examiner can normally be reached on M-F 9:00-5:30.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Michael Wityshyn can be reached on 571-272-0926. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

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